

IN THE CLAIMS

1. (Currently Amended) ~~A~~ ~~Device~~ for user interaction via ~~object-location~~locating an object in conjunction with an electronically refreshable display screen, the device comprising:

a transparent arrangement of sensors located ~~at—over~~ said electronically refreshable display screen for detecting a location of said object, said sensors having outputs, and

an arrangement of amplifiers for producing differential signals associated with said sensor outputs, said differential signals being signals indicative of a differential between at least two of said outputs and wherein the association between the amplifiers of the arrangement and the sensor outputs is dedicated, said device being operable to use said signals in said interaction.

2. (Original) The device of claim 1, wherein said amplifiers are differential amplifiers.

3. (Previously Presented) The device of claim 1, wherein said arrangement of sensors is configured for detecting an electric field.

4. (Original) The device of claim 1, wherein said electronically refreshable display screen comprises a flat panel type display screen.

5. (Original) The device of claim 1, wherein the object is a pointing device.

6. (Original) The device of claim 5, wherein the pointing device is a stylus.

7. (Original) The device of claim 1, wherein the object is a gaming piece.

8. (Original) The device of claim 1, integrated with a flat panel display.

9. (Original) The device of claim 1, packaged as an accessory to a mobile computer.

10. (Previously Presented) The device of claim 1, wherein the transparent arrangement of sensors comprises at least one organic conductive foil.

11. (Previously Presented) The device of claim 1, wherein the transparent arrangement of sensors comprises at least one ITO foil.

12. (Canceled)

13. (Previously Presented) The device of claim 1, wherein said transparent arrangement of sensors comprises a grid of straight line conductors.

14. (Previously Presented) The device of claim 1, wherein said arrangement of differential amplifiers comprises a plurality of differential amplifiers each having a first differential input and a second differential input, and wherein said first differential input is connected to an output of a first sensor, and said second differential input is connected to an output of a second sensor wherein the distance between said first and second sensor is larger than the effective range of the signal transmitted by said object.

15. (Previously Presented) The device of claim 14, wherein the distance between said second sensor and said first sensor is slightly larger than the effective range of the signal transmitted by said object.

16. (Canceled)

17. (Original) The device of claim 14, further being configured to detect phases of signals of said sensors, thereby to distinguish between signals from different sensors.

18. (Original) The device of claim 1, wherein said arrangement of differential amplifiers comprises a plurality of differential amplifiers each having a first differential input and a second differential input, and wherein each of said differential inputs is connected to at

least two outputs, each of said at least two outputs being associated with respectively non-neighboring sensors.

19. (Currently Amended) The device of claim 18, wherein ~~each~~ said object is configured to produce a field able to affect several neighboring sensors and wherein said respectively non-neighboring sensors per amplifier are selected such that different object positions generate outputs at different combinations of amplifiers, thereby permitting different amplifier combinations to be decoded to individual sensors.

20. (Original) The device of claim 18, further being configured to detect phases of said sensor signals, thereby to distinguish between signals from different sensors.

21. (Original) The device of claim 14, wherein each of said differential inputs are connected to at least two outputs, each of said at least two outputs being associated with respectively non-neighboring sensors.

22. (Original) The device of claim 1, wherein said object is a passive object, the digitizer further comprising an excitation arrangement located about said screen for sending an excitation signal to said object, thereby to energize said object to generate an electric field.

23. (Original) The device of claim 22, wherein said excitation arrangement is controllable to generate said excitation signal at a dynamically variable frequency.

24. (Original) The device of claim 22, wherein said excitation arrangement is controllable to generate said excitation signal at a dynamically variable amplitude.

25. (Original) The device of claim 22, wherein said excitation arrangement is controllable to provide a dynamically variable excitation duration.

26. (Original) The device of claim 22, further comprising blanking controllability for blanking of detection during output of said excitation signal.

27. (Original) The device of claim 26, wherein said blanking controllability is operable to continue said blanking for a predetermined delay after output of said excitation signal.

28. (Original) The device of claim 1, further comprising a compensation database in which differences in conductivity between individual sensors are encoded.

29. (Original) The device of claim 1, further comprising a compensation database in which fixed variations in electromagnetic interference over said sensing arrangement are encoded.

30. (Canceled)

31. (Original) The device of claim 1, further comprising an object movement history arrangement for storing data of immediately preceding movement of said object, and using said data in processing of a current location of said object.

32.-33. (Canceled)

34. (Original) The device of claim 31, wherein said processing comprises smoothing a locus of said object.

35. (Canceled)

36. (Currently Amended) The device of claim ~~35~~³¹, wherein said object movement history arrangement ~~with said predictor~~ comprises a ~~slow~~^{first} movement ~~tracker-filter~~ and ~~wherein there is further provided a fast-second movement tracker-filter, faster than the first movement filter,~~ for tracking said object, said device being operable to initially set an output of said ~~fast-second movement tracker-filter~~ as a locus of said object and

subsequently to use an output of said ~~slow-first movement tracker-filter~~ to correct said locus.

37. (Original) The device of claim 1, wherein said object produces an exponentially decaying signal, the digitizer further comprising signal multiplication functionality for multiplying said decaying signal by an opposite, exponentially rising signal, thereby to cancel out frequency side lobes and to increase frequency resolution of said digitizer.

38. (Previously Presented) The device of claim 1, further comprising transform functionality for transforming a detected time domain signal into a frequency domain signal.

39. (Original) The device of claim 1, further comprising transform functionality for transforming a detected time domain signal into a frequency domain signal, and wherein transform functionality is operable to dynamically select a transform type dependent on a current number of frequencies to be detected.

40. (Original) The device of claim 38, wherein said transform types for selection comprise the Fast Fourier Transform and the Discrete Fourier Transform.

41. (Original) The device of claim 39, wherein said transform types for dynamic selection include the Fast Fourier transform and the Discrete Fourier Transform.

42. (Currently Amended) The device of claim 41, ~~comprising a threshold, associated with~~ wherein said transform functionality, ~~for setting a threshold number of frequencies, said threshold for switching between~~ selects said Fast Fourier transform ~~for when detecting a high number of frequencies above a threshold relative to said threshold and selects said Discrete Fourier transform for when detecting a low number of frequencies below the threshold relative to said threshold.~~

43.-52. (Canceled)

53. (Currently Amended) A digitizer for user interaction with an electronic device having an electronically refreshable display screen, the digitizer comprising:

a transparent sensing grid located on said electronically refreshable display screen for detecting electronic signals from an object, said grid having a plurality of outputs, and
an arrangement of amplifiers wherein each amplifier is connected by a dedicated connection over at least two outputs of said sensing grid to produce an output signal being a function of said at least two outputs.

54. (Currently Amended) A digitizer for user interaction via an electronically passive object with an electronically refreshable display screen, the digitizer comprising:

a transparent arrangement of sensors located at said electronically refreshable display screen for detecting an electric field of said object, said sensors having outputs,
an arrangement of amplifiers associated with said sensor outputs wherein the association between the amplifiers of the arrangement and the sensor outputs is dedicated, and

an excitation arrangement for generating excitation signals for said passive object to enable said passive object to generate or issue said electric field.

55. (Currently Amended) The digitizer of claim 54, wherein the excitation arrangement is dynamically controllable to change a sampling rate at which said excitation signal is generated or issued and further comprising-comprising a state detector to detect a state of said object, thereby to carry out said dynamic control of said sampling rate.

56. (Original) The digitizer of claim 55, wherein said state detector is operable to detect at least one of a group comprising a user-switched state, a contact state of said object with a surface, a contact state of said object with said screen, a right click and eraser action.

57. (Canceled)

58. (Currently Amended) A digitizer for user interaction via an electronically passive object with an electronically refreshable display screen, the digitizer comprising:

a transparent arrangement of sensors located at said electronically refreshable display screen for detecting an electric field of said object, said sensors having outputs,

an arrangement of amplifiers associated with said sensor outputs wherein the association between the amplifiers of the arrangement and the sensor outputs is dedicated, and

an excitation arrangement for generating and issuing an excitation signal for said passive object to enable said passive object to generate said electric field,

and wherein said arrangement of amplifiers is controllable, in association with said excitation arrangement, with a blanking period such that said arrangement of amplifiers is prevented from detecting during issuance of said excitation signal.

59. (Previously Presented) A digitizer for user interaction via an object with an electronically refreshable display screen, the digitizer comprising:

a transparent arrangement of sensors located at said electronically refreshable display screen for detecting an electric field of said object, said sensors having outputs, and

an arrangement of amplifiers associated with said outputs, each amplifier being connected to outputs of at least two respectively non-neighboring sensors, said respectively non-neighboring sensors per amplifier being selected such that different object positions generate outputs at different combinations of amplifiers, thereby permitting different amplifier combinations to be decoded to individual sensors.

60. (Previously Presented) A device for user interaction via object location in conjunction with an electronically refreshable display screen, comprising:

a passive electromagnetic stylus;

a transparent sensing arrangement overlaid on said screen; and wherein said transparent sensing arrangement is configured for detecting an electric field of the stylus.

61. (Previously Presented) The device of claim 69, wherein said property is one of frequency, amplitude and phase.

62. (Currently Amended) The device of claim 69, wherein said excitation arrangement is operable to use a state of said object to set said dynamically controllable property.

63. (Currently Amended) The device of claim 62, wherein said state comprises at least one of a user-switched state, a contact state of said object with a surface, a contact state of said object with said screen, ~~a current velocity of said object, a current acceleration state of said object,~~ and a current orientation of said object.

64.-65. (Canceled)

66. (Previously Presented) The device of claim 14, further being configured to determine which of said two inputs of said differential amplifier is the source of said signal, based on detected signals at several neighboring differential amplifiers.

67. (Currently Amended) The device of claim 1, further comprising a compensation calibration database in which differences in the magnitude of the signal between individual sensors are encoded.

68. (Previously Presented) A device according to claim 60, further comprising an excitation arrangement for generating and issuing an excitation signal for said passive electromagnetic stylus to enable said passive electromagnetic stylus to generate said electric field.

69. (Previously Presented) A device according to claim 68, wherein said excitation arrangement is dynamically controllable to change a property of said excitation signal.

70. (Previously Presented) A device according to claim 60, wherein the transparent sensing arrangement is comprised of at least one organic conductive foil.

71. (Previously Presented) A device according to claim 60, wherein the transparent sensing arrangement comprises a grid of straight line conductors.

72. (New) A device for user interaction via locating an object in conjunction with an electronically refreshable display screen, the device comprising:

- a transparent arrangement of sensors located over said electronically refreshable display screen for detecting a location of said object, said sensors having outputs, and

- an arrangement of amplifiers for producing differential signals associated with said outputs, said differential signals being signals indicative of a differential between at least two of said outputs, said device being operable to use said signals in said interaction and wherein said arrangement of differential amplifiers comprises a plurality of differential amplifiers each having a first differential input and a second differential input, and wherein said first differential input is connected to an output of a first sensor, and said second differential input is connected to an output of a second sensor wherein the distance between said first and second sensor is larger than an effective range of the signal transmitted by said object.

73. (New) A device for user interaction via locating an object in conjunction with an electronically refreshable display screen, the device comprising:

- a transparent arrangement of sensors located over said electronically refreshable display screen for detecting a location of said object, said sensors having outputs, and

- an arrangement of amplifiers for simultaneously producing differential signals associated with said outputs, said differential signals being signals indicative of a differential between at least two of said outputs, and said device configured to use said signals in said interaction for detecting the location of the object.